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ABSTRACT

This bulletin reviews the last ten years of research on open space schools in an attempt to provide information for future decision making. The first section defines and presents the historical development of open space schools. The second section reviews the research concerning effects of open space schools on teachers, and section three discusses the research on effects of open space schools on students' achievement and behavior. Most of the research reviewed in these two sections deals with elementary and middle schools. Section four critiques the research presented and examines its credibility. Finally, conclusions based on the research reviewed are presented and recommendations are given for (a) possible future directions of research; and (b) design, construction, and implementation of open space schools. Some of the conclusions stated that teachers in open space schools (a) see themselves as more autonomous, and at the same time more highly influenced by their colleagues; (b) feel more satisfied with their jobs; and (c) spend less time on routine activities than teachers in conventional schools. The conclusions also stated that (a) both teachers and students in open space schools believe that noise level is a problem, (b) neither the open space school nor the conventional school has demonstrated academic superiority, (c) open space schools seem to provide greater opportunities for alternative learning goals, and (d) open space schools seem to facilitate growth of more positive self concepts in learners. (PB)

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Ten Years of Open Space Schools

A Review of the Research

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TEN YEARS OF OPEN SPACE SCHOOLS

A Review of the Research

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FOREWORD

Superintendents and school board members are confronted with many decisions every day. One of the most important types of decision is that which has a long-range consequence on the teaching-learning situations in their school district. Decisions concerning Open Space Schools fall in this long-range consequence category.

Paul George has reviewed the research on Open Space Schools and its implications for teachers, students, and principals. He has added important dimensions to his review - a critique of the research and conclusions/recommendations for those entering or already in the Open Space School to consider carefully.

There are no final cut and dried answers on the question: The Open Space School-do we or don't we build them? But, we believe there are enough research-related items in this bulletin to consider so that a district does not enter blindly into this innovation.

On behalf of FERDC, we thank Paul George for opening our eyes and minds to the Open Space School. Paul has done an excellent piece of work. We hope you will take time to read this review of research and see if you agree with us.

W. F. Breivogel, Ed. D.
Executive Secretary

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INTRODUCTION

Why Bother?

This is the century for revolutions, for all manner of radical realignments in every phase of the lives of American citizens. As an integral part of the society, the schools have also been subjected to the shock of transformation.

Many of the innovations which make their debut on the educational scene are without depth or significance and disappear as rapidly as they arrive. These may be ignored. Some of the metamorphoses which present themselves, however, are of such proportions or of such permanence that they can be disregarded only at great potential risk to the effective functioning of the entire educational system, for the foreseeable future. The open space school is one of these.

All across the nation open space schools are replacing more traditional structures at an almost frenzied pace. Parents, teachers, and pupils will live with these structures for the remainder of this century, yet few of those responsible seem to act in the light of a thorough knowledge of the potential impact of their decisions. The time has come to study what is known about the open space school and to apply this knowledge in future decision-making.

To continue to act without a clear vision of the consequences of those actions may be more than foolish. It may be disastrous. This review is pre-

sented to provide the opportunity for educational decision-makers to act with a more certain knowledge of what the consequences of those actions might be.

Definitions

Form follows function.

During the 1880's Louis Sullivan, described as a pioneer of American architecture, developed the thesis that structures are designed to accommodate the activity expected to occur within them (Consulting Engineer, 1971, p. 76). What occurs in schools is a function of the beliefs about the nature of teaching, the process of learning, the needs of learners, the structure of knowledge, and the mandate from society. Changing beliefs about these conditions for schooling have altered what educators believed to be the most effective instructional strategies to use within the school. This, in turn, has produced a startling new design for school buildings, the Open Space School.

No single term can accurately describe or delineate the considerable variety in the degree of openness, spatial arrangements and flexibility found in contemporary open plan school architecture. For convenience, the term "Open Space School" will be used for all schools characterized by the lack of interior partitions or loadbearing walls; schools in which the visual and acoustical separation between classrooms is limited or eliminated.

Because the degree of openness depends upon the extent to which partitions are absent and the size of the unobstructed space, a school becomes increasingly open as the size of the teaching area increases and the number of partitions decreases. An open space school is further defined in the literature and in this review as a school in which instruction occurs in open areas accommodating the equivalent of at least three conventional classrooms. The term "conventional school" will be used to describe schools other than open space schools; typically, the classroom with four walls containing one teacher and approximately thirty students (Stanford Newsletter, March, 1970, p. 1).

Finally, the term open space school, as defined here, is not synonymous with "open education", a term describing a specific instructional strategy employable in more than one type of school building.

Historical Development

In the first half of this century, school buildings were quite different than those being constructed today. One writer reports that in the early twentieth century an open space school was defined as one that received direct sunlight, and a closed school depended on artificial lighting (Moyer, 1972).

The following description should be familiar to persons who received their public school education prior to 1960.

There was a time when a school building looked like a medieval castle. It was built high and angular with turrets and spires, four or five stories of mortar and brick, and a roof that appeared to be aimed at the heavens. The tone it possessed was that of a fortress or a big city arena. It was a building designed to inspire awe.

Inside, the ceiling was perhaps 30' high, and the floor was concrete and the color of a battleship, and one's footsteps echoed high and hollow through the canyons of its halls. The classrooms were tightly structured. Five rows of desks and folding seats were bolted to the wooden floors. The rooms were lit by huge incandescent globes, and the windows were high and beyond the reach of anything but a long pole that dangled from a socket near the top of the wall.

It was not a place that one entered casually, but it was eminently suited to its purpose. A child knew that he had come here on business. The environment was rigid, as rigid as the techniques by which he was asked to learn. He listened carefully, and recited meticulously, and what he heard and spoke held as little variety as that which was offered his eye. (Consulting Engineer, November, 1971, p. 76).

The transformation in the design of the school building from those that fit the above description to the schools of the early 1970's occurred in stages and was accompanied by changing beliefs about the whole process of schooling. In fact, "changes in facility design can be related directly to changes in educational goals and processes" (Baas, 1972, p. 1).

These changes in beliefs began to be most apparent in the years following World War II, and in the early 1950's (Moyer, 1972, p. 34). During these years education began to feel the impact of great revolutions in the areas of communications and construction technology.

Many other dynamic changes came to influence the process of education: Population growth and redistribution, an explosion in the amount of knowledge available, especially in the behavioral and social sciences, the appearance of automation, cybernation and a variety of new social movements. All combined to transform the American vision of the mission of education.

This new society demanded a new process of education. The emphasis changed from teaching to learning, from passive to active student participation, from lecture and recitation to inquiry and discovery. Originality and creativity, self discipline, and responsibility combined with a new cultural feeling of freedom and independence. All of these factors produced a heightened awareness of the importance of the individual and a concern of the many

individual differences in style and personality (York County, 1973).

Prior to these new emphases, the typical school of the 1950's and early 1960's, often referred to as the "egg-crate school", was really a series of self-contained one-room schools connected by corridors and a gymnasium (York County, 1973). By the early 1960's, however, innovations had begun and State One of the movement to open space was underway.

As the educator's perceptions of the teaching and learning process expanded, the evidence appeared in the design of their schools. Team planning rooms, seminar rooms, teaching auditoriums and other special purpose rooms were incorporated into new structures. Nonloadbearing walls, folding walls, and other changes appeared as architects and educators began to work together (Moyer, 40).

Stage Two of the movement to open space began with the questioning of the ability of the traditionally structured school to facilitate innovative approaches to teaching and learning. Attempts were made to combine two, three, or more teachers with 100 or more students in one teaching area. It was at this point that the role of the school architect assumed a much greater significance (Frazier, 1972, p. 14).

During this second stage, the rationale for the new schools became more fully developed.

Teachers and students, it was said, needed a school building that facilitated at least three innovations: team teaching; variably-sized and rapidly changing learner grouping patterns; and, individualized instruction. Less expensive building costs were mentioned by a few (Frazier, 1972, p. 15).

It was thus that the first generation of open space schools was designed and built. Large instructional areas referred to as pods, units, suites, or classroom clusters accommodated larger numbers of teachers and students. Acoustical floor treatment, i.e., carpeting, became the norm. Libraries became educational media centers or learning resource centers. It was assumed, says Frazier, that significant amounts of team planning and teaching would occur in these new instructional areas and that the model of one teacher instructing one group of thirty students was obsolete (Frazier, 1972, p. 15).

By 1970, Stage Three of the open space movement was well underway. Over 50% of all new schools constructed from 1967 to 1970 were open space designs. In some states during this period, virtually all schools built were open space. (School Planning Labs, 1970). Schools designed during the period of 1970-1974 are identifiable predominantly by the disappearance of classrooms as they were known during the last century and most of this century. Partitions, moveable and folding walls vanished in elementary and middle schools. In high schools, however, open space remains limited to only portions of the school (Frazier, 1972, p. 16).

Many instructional changes accompany Stage Three. Since 1970 larger numbers of students (125, 150 or more) inhabit the same school space, and, while some semblance of the homeroom remains, it is becoming increasingly more common for these large units to be seen as wholes rather than as combinations of several home groups.

In many schools, the conception of teaming now moves away from the model of a group of specialists who exchange students on an inturn basis, to a fully integrated staff working together to plan and implement instruction for the total program (Frazier, 1972, p. 17). Individualized instruction has become the watchword for learning experiences in today's open space schools.

At the time of this review, the majority of elementary and middle school buildings being designed and built are totally open space schools, with a minimum of internal partitions, and larger and larger learning spaces. The future of the movement toward open space schools is unknown; the past at this point poorly understood. The present, therefore, becomes the crucial period.

Overview of the Review

The movement toward open space schools, as described above, has been underway for over a decade and a great deal of professional and research literature has been produced to document the impact of this facility on the instructional programs within.

At this time, however, no comprehensive up-to-date review of this literature is available. The most effective design of school buildings for the remainder of this century demands a thorough knowledge of the impact of the open space school as it exists today. The remainder of this bulletin attempts to provide this review focusing on the effects of open space schools upon programs for learning operating within them.

Since open space schools affect three groups most directly, the next two sections of the bulletin will focus on the effects of open space upon teachers, upon students, and upon the school administration. Since open space school construction has occurred with greater frequency in elementary and middle schools, most of the research reviewed here deals with these levels. The reader should assume that unless specifically mentioned the data are not drawn from high schools.

An attempt will be made to critique, in summary fashion, the professional and research literature itself. Finally, conclusions, recommendations to practitioners, and recommendations for further research will be presented. These conclusions and recommendations must remain extremely tentative, however, until open space schools are known to be functioning as they were intended. Knowledge to date adds more to our understanding of how these schools are functioning now rather than what the impact of the open space schools might be when and if they operate as intended. A comprehensive bibliography is included.

OPEN SPACE AND TEACHERS

The Stanford Studies on Open Space Schools and Teaching

The Stanford Center for Research and Development in Teaching has studied the impact of open space schools upon teachers in greater depth than any other group or individual. The Stanford Center has focused on the question of the degree to which open space schools have had an influence upon the activities of teachers in school, teachers' relationships to each other and to principals, and teachers' professional orientations.

The Stanford research is based on the assumption that team teaching is an essential part of open space schools and one of the most important reasons for leaving the conventional school behind. Drawing largely from the sociological study of occupations, researchers began with the assumption that isolation leads to ossification in any profession, and that teacher isolation in the self-contained classroom has, therefore, been the source of many educational problems.

This teacher isolation has led to an insulation from innovation, and it has produced negative effects upon teacher development and personality. Isolation, has, perhaps, prohibited effective collaborative efforts among teachers and between teachers

and principals. A crucial factor to the school, the importance of the interaction of participants as they work, has been inhibited. (Meyer, 1971, p. 7).

Interaction and Visibility

Open space schools make two significant changes in the working relationships of teachers. First, since teaming almost always occurs, there is a shift in decision-making from one teacher to a group of teachers. Second, teachers now work in full view and within hearing distance of each other. It is the influence of these changes that the Stanford researchers sought to investigate.

The Stanford group formulated a number of research questions: Does open space actually increase the amount of work related interaction between and among teachers? Does open space increase the overall amount of influence teachers have? Does open space increase the amount of explicit evaluation of teachers which occurs in the school? Does open space increase the job satisfaction of teachers? Does open space have an effect on professional ambition in teachers? Does open space produce a focus on the curriculum and formal academic learning, rather than on a broader concern with interest in the child as a person?

Two types of schools were selected for these studies: first, schools in which its teachers were organized into teams to plan and implement programs in open space; second, schools where teachers worked

individually in the traditional self-contained classrooms. These same general categories fit almost all studies of the open space school, not just those conducted by the Stanford group.

Myer and his Stanford colleagues discovered that there was, indeed, much more teacher-to-teacher interaction in the open space school than in the conventional school. Open space teachers reported significantly more interaction than conventional school teachers in both informal talk with colleagues, and in frequency of interaction via team meetings (Myers, 1971).

A second index of interaction studied, teacher interaction with the school principal, revealed that in this study, the design of the building had little effect. In neither open space schools or conventional schools do teachers report much work-related interaction with the principal. The principal is almost totally isolated and apart from the instructional experience of teachers, and the type of school design makes no apparent difference (Myers, 1971).

Visibility and Evaluation in Open Space Schools

Stanford researchers have also been concerned about the relationship between teacher visibility in open space and the amount and types of evaluation of teachers that occurs. It was hypothesized that greater visibility would lead teachers in open space to view evaluation by their colleagues as more soundly based and of greater importance than

would teachers in conventional schools (Marram, 1972).

If teachers should accept criticism from their colleagues in an atmosphere which promotes personal and professional growth, rather than suspicion and recrimination, researchers reasoned that the more visible a teacher is, the more likely he is to believe colleagues' evaluations of him are sound. The more sound the evaluations, the greater the importance that will be attached to them. Because soundly based evaluations by colleagues should have an effect upon teachers' perceptions of themselves and their roles, teacher visibility could conceivably have a major impact on what happens in schools (Marram, 1972).

A questionnaire, sent to 244 teachers in 15 elementary schools, revealed major differences between teachers in conventional schools and those in open space schools in teacher reactions to colleague evaluations. The findings of the studies give strong support to the contention that visibility, soundness and importance of evaluations are positively associated with each other (Marram, 1972).

Informal evaluation by colleagues happens almost twice as frequently in open space schools as it does in conventional schools. Teachers in conventional schools rejected the importance of colleagues' evaluation, preferring those of students and principals. In the open space school, however, the perceived importance of all evaluators was

much more positive (Marram, 1972). Collegial evaluation was much more highly valued, with the significance of evaluation by the principal slipping to third place, behind that of students. A norm for colleague evaluation of work is, therefore, being established in the open space school (Meyer, 1971).

Teachers in open space schools still seem more concerned, or anxious, about the evaluation done by the school principal, even though teachers believe peer evaluation is more accurate. Teachers are confident about the evaluations of them done on a day-to-day basis. They seem anxious about the principal's evaluation because it is crucial to their career progress, even though this evaluation may be based on far fewer actual observations of one's teaching.

In simple terms, teachers are anxious about the principal's evaluation even though they believe the evaluation has little validity (Marram, 1972). Open space school teachers are much more supportive of evaluation by their colleagues, seeing it as having greater soundness because of increased visibility.

Teacher Influence in Open Space Schools

The Stanford group also pursued the question of the impact of face-to-face interaction in open space schools on the distribution of influence within the school. Paradoxically, the research indicated that, as compared to conventional school teachers,

teachers in open space schools see themselves as more autonomous, but at the same time, more highly influenced by their colleagues (Meyer, 1971). Apparently this develops because of the replacement of the principal by the teaching team as the primary focus of influence.

In the conventional schools the principal was perceived as having the most influence over the task performance of individual teachers, while in open space schools the teacher group was perceived to be most influential on teacher task performance (Brunetti, 1970). In one study, forty-four percent of the teachers in open space schools reported that they were influenced a "great deal" or a "considerable amount" by their colleagues, as opposed to only eighteen percent of the teachers in closed space (Meyer, 1971).

These same open space school teachers report higher levels of autonomy than do conventional school teachers, presumably because of the reduction of the principal's authority in the open space school. Open space teachers held expanded decision-making authority and replaced the principal as the focus of authority within the school (Brunetti, 1970).

What about the teachers' perceived level of influence upon school-wide matters? Does it vary from one type of school design to another? Again, open space school teachers report perceptions of greater school-wide influence, in developing school goals and objectives, and structuring school rules and regulations. Open space school teachers seem,

therefore, to develop a higher sense of autonomy than teachers in conventional schools (Meyer, 1971).

The situation seems to be that, in open space schools, the teaching team becomes the center of interaction, influence and evaluation. The principal is not eliminated, but the power of the teacher group is greatly increased by the interaction permitted by the open space school (Meyer, 1971). Because of this strong group structure, teachers in open space schools were also more resistant to outside influence (Brunetti, 1970).

In a further analysis of the meaning of autonomy in relationship to school design, Meyer concluded that autonomy may have had two different meanings, one for teachers in open space schools and one for teachers in conventional schools. Teachers in conventional schools may view autonomy as isolation from authority, while teachers in open space schools may interpret it as a greater sense of personal input into decisions and control over events (Meyer, 1971).

Meyer (1971) and his colleagues also discovered that there is a relationship between the feeling of autonomy and years of experience in the classroom. Beginning teachers in open space schools reported feeling less autonomy than their counterparts in conventional schools. It is the experienced teacher in open space schools whose autonomy grows; perhaps in response to a feeling of knowing their jobs and being familiar with the ropes. New teachers apparently have a tendency to play the role of subordinate in open

space schools. Open space schools should, therefore, be especially appealing to experienced teachers who have an opportunity to play a leadership role on a school-wide basis.

Job Satisfaction in Open Space Schools

Teachers in all of the schools studied reported a great deal of job satisfaction. On the whole, Stanford researchers found, however, that there is an indication that open space school teachers were more satisfied with their jobs than teachers in conventional schools. The source of the higher job satisfaction on the part of open space school teachers is still unclear. Is it the result of open space schools, or is it a Hawthorne effect which will wear off in time? Do open space schools tend to attract teachers who have a higher level of job satisfaction in the first place? There seems to be no final answer available at this point. While teacher group influence and autonomy both contribute to job satisfaction, these factors do not account for all the difference in job satisfaction between teachers in open space schools and conventional schools (Meyer, 1971).

Meyer (1971) points out that it may be that much of the observed effect of open space schools upon job satisfaction may be quite transitory. While autonomy, influence and interaction factors will remain, there is no way to be sure that job satisfaction does not derive largely from novelty, newness which produces a spirit of comraderie and creative opportunity. To the degree that job satisfaction depends on

this newness, it will probably fade as the novelty disappears.

Ambition in Open Space Schools

Does teaching in an open space elementary school have an impact on the level of teacher professional ambition? Another Stanford researcher, Cohen (1973) studied relationships between the greater opportunities for interaction, influence, and autonomy on the tendency of teachers to be career-oriented. The particular focus of Cohen's analysis was on the question of whether open space schools had an effect on the relationship between professional ambition and job satisfaction.

Two types of ambitious teachers were studied. The first is the teacher described as Professionally Ambitious, a teacher who wishes to become more influential and to receive special recognition within the teaching situation. The second type, Vertically Ambitious, includes the teachers who were willing to leave the classroom to achieve greater rewards and increased status. It is possible, of course, for both types of ambition to be held in different proportions by the same teacher.

Results indicate that there was a much higher proportion of Professionally Ambitious teachers in open space schools than in the conventional schools (Cohen, 1973). Whether or not there was a self-selection process involved, the data indicate that in the open space schools women with higher

levels of Professional Ambition are more satisfied than are women with low levels of Professional Ambition.

Since the reverse of this relationship holds true in the conventional schools, the conclusion is that the increased level of interaction and influence of the open space schools has a positive effect on job satisfaction for teachers who seek expanded teaching roles. In the conventional schools these same teachers are frustrated by the lack of opportunity, hence the lower job satisfaction in these conditions.

The relationship between Vertical Ambition and job satisfaction in the open space schools remains as negative as it had been in the conventional school (Cohen, 1973). The more Vertically Ambitious a woman declares herself to be, regardless of the design of the school, the less likely she is to be satisfied with her job. As might be expected, these same teachers are also more likely to be favorably inclined to a job outside education.

Cohen reasons that the work setting of the open space schools quite possibly creates as well as serves Professional Ambition (Cohen, 1973). Assuming that teachers who possess this Professional Ambition are the teachers that educators would most like to encourage, it is clear that organizational arrangements typified by the conventional schools do just the opposite. Unfortunately, the open space schools by themselves fail to provide any additional opportunity for

the teachers seeking vertical promotion, leaving these teachers as frustrated as they were in the conventional school (Cohen, 1973). Administrators of open space schools may need to increase their efforts to provide such opportunities for morale to be at its highest.

Concern about the traditional picture of the ambitious woman in American society, particularly as it relates to education, led researchers to study the relationship between this ambition and positive warm feelings toward young children (Meyer, 1971). According to this view, only women whose needs are completely satisfied by the gratification stemming from interaction with children are suitable for teaching. They are the only ones who care deeply enough about children, or so the story goes. The research of the Stanford group seems to put the lie to this version of woman's role.

In fact, the data seem to indicate that both indices of ambition, professional and vertical, are positively related to an orientation toward growth-producing relationships with children (Meyer, 1971; Cohen, 1973, p. 157). Ambitious teachers are more likely than unambitious teachers to care about both the child as a person and as a learner. This conclusion supports the thesis that one must care about children to make teaching a life long career, and should go a long way toward quieting the apparently unjustified criticisms of the ambitious but dissatisfied women in teaching. (Cohen, 1973, p. 158).

Other Studies of Teacher Behavior in Open Space Schools. Verbal Interaction and Use of Time in the Open Space Schools

Researchers have responded to the claim that specially designed schools (open space schools) give team teaching an opportunity to function as it was conceptualized. One study (Ellison, Gilbert and Ratsoy, 1969) examined the question of whether teachers in an open space school teaming situation differ from those in self contained classrooms in conventional schools in the patterns of verbal interaction and in the utilization of time in the classroom.

Using an eighteen category observation record, observers recorded a number of differences between teachers in an open space school and in a conventional school regarding teacher activity and utilization of time (Ellison, Gilbert and Ratsoy, 1969, p. 19). Teachers in the conventional schools spent more time conducting routine activities such as morning exercises, taking attendance, collecting money or making announcements. Teachers in the open space school spent more time observing other teachers teaching, interacting with adults, and in making transitions from one type of activity to another.

In this study, however, no differences between teachers in open space schools and the conventional schools were found in the area of presenting information or on instructional supervision. The rationale for open space schools and teaming, of course, implies that differences in these areas will or ought to be prominent.

The second part of this study focused on the possibility of a relationship between school building structure and teacher-student verbal interaction. Using a modification of Flanders's interaction analysis, observers studied reading, mathematics, and social studies classes. Contrary to what might be expected, these researchers found data suggesting that open space school teachers tended to spend more time in large group instruction than did the teachers in the conventional school.

Following from this, the study presented data which revealed that, at least in these two schools, verbal interaction was quite different. In the open space school teacher talk comprised 45.5 percent of the tallies, while in the conventional school teacher talk added up to 36.8 percent of the interaction. The difference was primarily in the area of presenting information; 14.4 percent in the conventional school, opposed to 25.8 percent in the open space school. The authors of the study concluded that, apparently, teachers in this particular open space school were more inclined to continuous talk in large group settings, and less interested in supervising other types of small group and individual learning activities.

Ellison, Gilbert and Ratsoy (1969, p. 21) stated that perhaps the most striking features of their study was, however, the high degree of similarity between the two schools in both verbal interaction and teacher time utilization. It appeared that the structural differences between the two schools did not greatly alter the teacher

behaviors within them.

Effects of Inservice Education

In one of the earliest and most thorough studies of the emerging open space schools, Kyzar (1961) compared three open space elementary schools. Kyzar advanced some very tentative statements about influence of open space schools on teacher behavior: In five of the seven components of instruction observed, statistically significant differences were found favoring the open space school.

Ten years later, Kyzar (1971) extended the original study to include a thorough investigation of teaching techniques, order maintaining techniques, provisions for individual differences, psychological climate, social organization, and activities utilized in the instructional program. Eight schools, four open and four conventional, participated in the study.

The schools were matched, open space with conventional schools, on the amount of preparation given to the faculties prior to opening the open space schools. In one pair the faculty of the open space schools had extensive inservice education; in the second, the faculty had some preparation; and the faculty of the open space school in the third pairing had little preparation.

Inservice education emerged as an apparently significant factor (Kyzar, 1971). This seems to be especially applicable for new schools. Where instruc-

tional differences occurred in the study they constantly favored the open space school which had extensive faculty inservice education prior to the opening of the school. Comparing the open space school in which the faculty received little or no pre-opening aid with the conventional school, there were significant differences in the kinds of activities utilized for instructional purposes. Reading occurred much more frequently in the open space schools than in the conventional schools with which they were paired. Discussion and free choice activities occurred much more frequently in the conventional schools (Kyzar, 1971).

Preparation of the faculty prior to the opening of the school also revealed differences in instructional strategies when two of the open space schools were compared. Teachers who were prepared for the open space schools relied much less on writing and reading and used more discussion than did the teachers who had received little inservice education (Kyzar, 1971). Kyzar concluded that the lack of preparation for open space teaching led teachers to choose quiet activities.

Teaching Style

Researchers in Toronto studied the impact of open space schools on teaching style (Metropolitan Toronto School Board, 1972). A scale of teaching styles was developed by combining a measure of engagement (talking or listening to students) with indicators of the formality or informality (tension) of the situation and the adult's actual physical position in relation to the pupils. A "high style" indicated

a lack of engagement, more formality, and being physically distant from the pupils. A "low style" indicated an engaged, relaxed teacher, physically near the students. The highest percentage of "low style" teaching in this study occurred in the open space schools. The highest level of "high style" teaching occurred in the conventional school (Metropolitan Toronto, 1972).

Research by anthropologists (Smith, 1971) in eleven open space schools produced some interesting data on teaching style. Apparently, each group or team of teachers develops its own highly individualistic style in response to the problems and opportunities of open space. Some teachers act as though there are visible walls. Some group their students in large sections and teach by turn. Others become enthusiastic teams, working together effectively.

In a study comparing open space schools, departmentalized, and self-contained schools, Townsend (1971) concluded that using Flander's Interaction analysis was relatively unproductive when searching for differences in teaching style. A study by Warner (1970) confirms this finding. The study by Townsend did reveal, however, an indication that open space teachers exceed the teachers in the other schools in the use of Flander's category 3 (accepts or uses ideas of students). He also discovered that, in this study, the use of media decreased in use from lower to upper grades in the departmentalized school but increased in use in the open space school from lower to upper grades.

Finally, in terms of teacher style, Townsend's study revealed that teachers in the open space schools used more grouping techniques at the sixth grade level than the other two schools. Warner (1970) confirmed this tendency of open space school teachers to spend greater periods of time with variable size groups and used more materials than teachers in conventional schools.

A study conducted in Kansas (Shain, 1972) was designed to identify any existing relationships between teacher personality preference, teacher satisfaction, and competence in teaching. The study focused on personality styles identified by the Myers-Briggs Type Indicator (MBTI), a personality inventory based on Jungian personality theory.

The MBTI was administered to 50 teachers who had at least two years experience in an open space school preceded by two years of teaching in a self-contained situation. The data were statistically insignificant, but indicated that those teachers who were very satisfied with their teaching situations and who received high competency level ratings by their principals exhibited a preference in their decision-making patterns based on person-oriented values rather than impersonal logic (Shain, 1972).

The author suggests that school administrators seeking teachers with a higher probability of being successful and satisfied in an open space school might look for persons with a tendency toward extraversion combined with preference for feeling-oriented decision-

making (Shain, 1972). Considering the nature of teaching in the open space schools, with its expanded interpersonal interaction, it does seem reasonable to expect this type of outcome.

In another study of the relationship between teacher attitude and classroom style, Mills (1972) gathered data pointing at several possibilities. Teachers in the open space schools performed at a higher level in professionally-related affairs outside the classroom. These same teachers exhibited attitudes which, measured by the Minnesota Teacher Attitude Inventory, are more permissive, accepting, and sympathetic toward students. Open space school teachers indicated support of greater pupil freedom and self-direction. The author firmly recommended the adoption of cooperatively taught open space classrooms (Mills, 1972).

Is it possible that body motions used in the open space schools differ from those of teachers in the conventional schools? According to one researcher (Grant, 1973) such is the case. Based on observations and data collected by videotape, Grant concluded that, instruction aside, the open space school teachers' specific bodily movements, postures, and stances do differ from those of their colleagues in self contained classrooms.

In a stricter pedagogical sense, however, it appears that there is very little difference between teachers in open space schools and conventional schools regarding the kind of general motions to communicate

or to instruct. All teachers survey, point, gesture, etc., in cyclical patterns repeated continuously in the process of instruction. All teachers use similar instructional motions in support of their teaching, regardless of building structure (Grant, 1973, p. 210).

Teacher Opinions About Open Space Schools

A number of studies have attempted to shed some light on the effectiveness of open space schools by asking teachers about their opinions and reactions. The advantages and disadvantages of open space schools as perceived by teachers should yield some important data for analysis.

Kaelin (1970) learned something important when he questioned teachers from eleven open space schools in Florida. Teachers believed that open space schools did facilitate individualization. They were dissatisfied, however, with problems of student supervision which they felt emanated from open space schools. Confirming the Stanford studies, teachers reported that they were working in teams and that this teamwork was a very positive experience.

Teachers feel that students in open space schools have increased opportunities to associate with their peers socially and in study relationships and that individualizing is the raison d'etre for the existence of open space schools (Etheredge, 1972). The teachers seemed to feel that the open space school lends itself to the danger of overcrowding

to a greater degree than the conventional school (Kaelin, 1970).

In an early study of the impact of open space schools upon the effectiveness of team teaching in one school, Kane (1965) described conclusions reached concerning the use of this open space school for teaming. The study found, for example, the poor utilization of small and large group space resulted in an illusion of lack of space. In addition, the planning process in teams was inhibited by the smallness of the planning rooms and the fact that fixed peripheral seating forced teachers to turn away from their desks for team conferences. Movable walls proved to be effective in providing easily changeable divisions between instructional spaces (Kane, 1965).

A study from British Columbia (Pritchard and Moodie, 1971) reported that an overwhelming majority of the 109 teachers who responded to the survey indicated that they enjoyed the open space schools and that given the opportunity, they would choose to teach in an open space school again. A similarly large number (92%) believed that the students enjoyed it and that an equal or greater amount of learning occurred in the open space schools when compared with the conventional schools. Many teachers (71%) felt that discipline problems were quite similar to those encountered in the conventional schools, and that the open space schools actually fostered better personal development in pupils.

This study (Pritchard and Moodie, 1971) uncovered several reservations regarding open space schools held by teachers. An overwhelming number (98%) of the teachers, for example, believed that some lessons in some subjects required a more conventionally closed space than usually offerred by open space schools. Over half of the teachers surveyed agreed that the square footage available for instructional purposes was too small, that greater time was required for lesson preparation in the open space schools, and that teacher education had failed to prepare them for their experience in open space schools.

These teachers also believed that the open space schools facilitated team teaching, individualized instruction, and flexible student grouping (Pritchard and Moodie, 1971). They felt that open space schools provided more social interaction for students and teachers, and that, perhaps as a result, immature children may be unable to cope with learning in open space schools. Finally, this study revealed that these teachers, concerned about the noise factor and the resultant distractability, also often relied upon teaching strategies which allowed them to avoid disturbing teachers and students in other open areas.

Other studies of teacher opinion regarding open space schools tend to support these data. A study in Florida (Broward County School Board, 1972), found that despite dissatisfaction with a variety of things, the overwhelming majority of open space school teachers surveyed rejected a return to conventional plants and teaching methods. Broward County fifth grade teachers

also felt that noise was much more of a disturbance in open space schools than in the conventional schools.

Oldridge (1972) reports a study in which teachers again saw the noise level and distractability as a serious problem, even though the open space schools were conducive to teaming, individualizing, and flexibility in grouping and scheduling.

In a study of 306 schools, Moody (1971), found that teachers' opinions regarding open space schools have a strong relationship to years of teaching experience. The more experience a teacher had, the more likely they were to give a high rating to teaching in open space schools and to other related innovations like teaming, individualizing, flexible scheduling, etc. This was the case, however, only when the teacher had actually had some experience with the innovations in question. With teachers who had not had experience with these innovations, as the ages of the teachers went up, the ratings of teaching in open space schools went down.

Moody's interpretation of this data was that it did not indicate that the more experienced teachers will resist change. It means, said Moody, that these teachers must be provided with successful experiences in open space schools before they can support such radical departures from what had been the norm. When the evidence and experience is provided, the data indicates that the experienced teacher becomes the strongest supporter of open space school teaching.

The Stanford studies, discussed earlier, confirm this experience factor, and Oldridge (1972) agrees that selection of staff becomes a most crucial factor in the operation of the open space schools. Moody ventures the opinion that in light of these data on teacher experience, perhaps as open space schools become a more familiar feature and less in the category of an innovation, it may be more likely that more positive teacher opinions regarding open space schools will develop.

In a study of teacher opinion about open space schools conducted at Wayne State University (Cheek, 1970), teachers reported being confused about the exact purposes of adopting the open space school concept for their school. Again and again, the teachers identified the professional preparation and training of teachers as a major concern before building an open space school (Deibel, 1971; Wise, 1970).

The teachers in the study by Cheek (1970) agreed that open space schools did facilitate a higher level of a variety of interpersonal interactions. They were less certain, however, that these interactions contributed a great deal to the learning process. The teachers did see discipline and the noise factor as serious problems, even though they believed that the open space school may facilitate positive and socially beneficial teacher-pupil interactions. There was disagreement as to whether or not the open space school facilitated teacher-to-teacher interactions.

A study of supervisory needs in open space

school as perceived by teachers (Klëparchuk, 1969) revealed teachers' desire for more help in maintaining good team relations, keeping the team in good interpersonal working order. Teachers felt that the task of the school principal was to create a climate which was conducive to open discussion and learning for the staff. Confirming the findings of the Stanford studies in the area of professional ambition, Kleparchuk (1969) found that teachers were eager for the principal to create more opportunities for all teachers to take a more active role in program planning and decision-making.

The teachers were also interested in being encouraged to experiment and innovate in the area of curriculum and instruction, particularly in the area of developing student independence and responsibility; again, a confirmation of the Stanford research.

In this study teachers indicated considerably less interest in supervisory activities which focused on traditional areas such as classroom visitations, help with lesson plans, or unit development. Teachers in open space schools wanted autonomy insofar as their daily teaching was concerned, and asked for help in effective teaming and inclusion in schoolwide policy making.

Preparing Teachers for Open Space Schools

In response to a questionnaire, school superintendents of districts with open space schools stated that they believed that the great majority of teachers

are illprepared for open space schools (Stanford University, 1970). Teachers were described as unable to function effectively in team planning, individualized instruction, and in interpersonal relationships within the school. If this is the case, and many writers agree that it is, what does the literature tell us about the most appropriate inservice education for teachers going into open space schools?

The problem of training teachers to work in the open space schools is described in the following statement:

> In fact, an open plan school can be as restricting as an eggcrate. If the teachers do not know how to use the space, it becomes a bland, neutral envelope in which traditional subject matter is taught in traditional class sizes. As each teacher increases the decible level of his voice to be heard over the voice of the adjoining teacher, the noise assults the ears of the entire population. Tensions mount, and teachers wonder about the effectiveness of open space. They begin to erect physical barriers between themselves and the neighboring group. Blackboards, casework, carrels, and anything else they can find become dividers, territory definers, acoustical isolators. Even the students might

> begin to wonder if this was what teachers really had in mind for an open learning environment. "It's just like the old school, only there aren't any walls and it's noisier." (Busselle, 1971, p. 87).

Unfortunately, little experimental research has come forth to offer clues on the best approach to preparation of teachers for open space schools. All writers in the recent literature, however, seem to agree on what they think may be important for inservice education.

All agree, for example, that it is crucial that key personnel for a new open space school be appointed as early as possible (Cramer and Barnes, 1973). Staff development and curriculum planning must begin, ideally, with the design of the building itself (French, 1972). Optimally, all of these inservice efforts should begin one year in advance, giving the teachers involved the opportunity to participate in the development of and to come to agreement with a philosophy and statement of goals for the program (French, 1972, p. 7).

Providing adequate time for this kind of staff development implies released time. After school and Saturday sessions tend to be counterproductive rather than helpful (French, 1972, p. 8). It also implies that teachers be meaningfully involved in preparing their own training experiences (DeMase, 1972).

Richardson (1970) questioned almost 200 teachers from open space schools regarding their

views on inservice preparation for teaching in open space schools. The teachers agreed that extensive inservice time was needed to prepare teachers for a new program and facility, both prior to the school opening and during the first year of operation.

The teachers in Richardson's study also indicated that, at least where open space schools are concerned, certain types of inservice programs are more effective than others. Consultants who are "lecturing generalists" were considered less desirable than assistance from practicing teachers in innovative schools. Laboratory situations, simulations, demonstrations, and actual participation are all highly desirable from the teacher's point of view. These preferences are confirmed by others (Cramer and Barnes, 1973, p. 10).

Busselle (1971) indicates that, once the open space school is operational, a number of items become priorities for intensive inservice training. Teachers will need help in relieving congestion, tension and noise. Team planning skills need to be developed. Teachers need to be encouraged and supported in the effort to open the space up as it was intended to be. French (1972) indicated that the first week of school ought to be a time for orientation to the building, for all concerned, without the expectation of much subject area learning. From that point on, evaluation and directional inservice sessions will need to be conducted every month or six weeks (French, 1972).

OPEN SPACE AND STUDENTS:

ACHIEVEMENT AND BEHAVIOR

Student Achievement in Open Space Schools

The data available on the impact of the open space school structure upon student achievement is incomplete and contradictory. Some studies show differences favoring the open space school while others offer data favoring the conventional school. Factors such as sex, race, and socio-economic level of the students also are involved.

One study from Florida (Broward County School Board, 1972) focused on third, fifth and eighth grade pupil achievement. Using county wide tests, results very tentatively indicated that third grade data slightly favors open space schools, but the differences were not statistically significant. In the fifth and eighth grades, results tended to favor the conventional school.

The data also indicated sex and race differences. The results seemed to indicate that perhaps, to a very limited extent in terms of achievement tests, the open space school was better for black students and the conventional school was better for white students. Sex differences appeared to indicate that boys do better in open space schools while girls fare better in the conventional school (Broward County, 1972, p. 5).

Other factors were also involved; age of the student and the length of time living in Broward County seemed to have effects. Younger students seemed to fare better in open space schools, perhaps because they had had little experience in the conventional schools. Also, when the length of time lived in Broward County was held constant, differences in open space schools and conventional schools in math achievement disappeared, leading again to the speculation that experience in the open space schools leads to an adjustment which allows achievement levels to return to normal.

A study of reading achievement in the schools of Vancouver, British Columbia (Moodie, 1971), indicated an age-grade level relationship similar to that suggested by the Broward County data. Comparing reading skills such as speed and accuracy, vocabulary and comprehension, testing early in the school year indicated that the mean score of the speed and accuracy scale was significantly lower for open space school students than for conventional school pupils. Scores on vocabulary and comprehension were not significantly different.

The same survey given to the same students five months later revealed that the mean score differences in all three areas of reading skills tended to diminish to insignificant levels. Another more limited Vancouver study (Reid, 1972) showed data which indicated some superiority of open space schools over the conventional schools related to reading and math skills. Again, there appears to be a time and adjustment

factor which may influence achievement test scores for students in open space schools.

In a study comparing an open space school with two types of conventional schools (self-contained and departmentalized) Sackett (1971) reports that, when IQ scores were held constant the students in the open space school were significantly lower in achievement test scores than students in either of the conventional schools. A very similar study (Townsend, 1971) of pupil achievement reached similar conclusions. Data from sixth grade tests indicated that scores for boys from both self-contained and the departmentalized schools exceeded those from the open space school in all academic areas. Data from second graders in the study confirmed the higher scores for students in the conventional schools.

A number of additional studies offer contradictory statements. A study of reading achievement (Harrington, 1971) failed to note any significant differences in reading gains between students in open classroom areas, and those in enclosed areas. Still another study using standardized achievement tests failed to detect any significant differences between open space schools and conventional schools (Warner, 1970). A rather carefully controlled study in York County, Ontario found that for grade one pupils in open space schools and conventional schools, when IQ scores were not significantly different, differences in achievement test scores were found to have no significant differences, but with marginal differences tending to favor the open space schools (Burnham, 1971a, p. 24).

Analyzing the data on student achievement as a whole, it seems that there have been no consistent differences in academic achievement between open space schools and conventional schools as measured by standardized tests (Read, 1973). While some differences have emerged in one study or another, for the most part these differences are restricted to small studies of local situations with limited experimental controls.

Some writers (Brunetti, 1971b) conclude that available measures of academic achievement simply are not sensitive enough to measure whatever differences, if any, exist between the open space schools and the conventional schools.

In fairness it should be stated that open space schools were never touted for potential superiority in academic achievement. The open space school was designed to offer opportunities for different teaching strategies and alternative learning goals. As long as academic achievement does not suffer, therefore, the improvement of opportunities for these alternatives are equally important (Brunetti, 1971b, p. 10).

Student Attitudes and Quasi-Academic Behavior in Open Space Schools

Several studies have dealt rather thoroughly with the level of activity (i.e., movement) in open space schools as compared with the conventional schools. The Toronto study (Metropolitan Toronto School Board, 1972), for example, concluded that

there seemed to be more physical activity in the open space schools than in the conventional schools. Physical activity, including movement and use of a variety of tools, was much more frequent in the open space schools.

The Toronto study (1972) measured the distribution of students through the available space in the classroom. The open space schools had a significantly lower percentage of time in which students were clustered in large learning groups. The number of students observed working alone was also much higher in the open space schools. And it seems as though size of the total group also had an effect, in that when there were more than twenty students in a classroom area, there were fewer students studying independently.

The Toronto researchers indicated that it was possible that the differences in the levels of general activity observed, favoring the open space schools, could have been the result of the teachers and their differences rather than from differences among the facilities. Since there were no significant differences in teacher characteristics across schools, however, there is still an area of uncertainty.

Another Canadian study of pupil activity in open space schools utilized the shadow study approach (York County Board of Education, 1970). Each observer shadowed one student in an open space school and one in a conventional school. Their conclusions were that while neither open space schools or the conventional schools offered great opportunities for pupil decision-

making or inquiry, the general trend of the evidence supports the claim that contemporary theories of desirable student behavior are more closely associated with the open space schools and more readily identifiable there. These behaviors include initiating and pursuing independent activities, personal responsibility, teacher-pupil planning, and divergent questioning (York County, 1970, p. 58).

Building on the work of the Stanford group, Erika Leuders-Salmon (1972a) extended their research to include a study of the impact of the collegial relationship, team teaching in open space schools, upon the educational experience of children. Measures of child activity in the classroom were related to type of school, size of teaching team, and a measure of teacher attitude. A sample of 22 collegial teams and 11 teachers in self-contained classrooms was observed.

The Leuders-Salmon study (1972a) indicated that children in open space school team teaching situations were likely to be much more active than those in self-contained classrooms. In fact, there was approximately twice as much pupil movement discovered in the open space school as in the self-contained classrooms.

In this and other studies, because only teams were observed in open space schools, and only individual teachers in the self-contained classrooms, it was impossible to separate the effects of teaming from the impact of open space schools. In combination, however, open space schools and teaming apparently lead to a much more active classroom (Leuders-Salmon, 1972, p. 35).

A number of factors may contribute to this situation. Team planning may allow the development of more activities. The seemingly greater space available in the open space school, illusory or not, may encourage children to move and the teachers to be less conscious of or offended by this movement. The carpeting common to open space schools may reduce the noise usually associated with activity and thus make it less noxious to teachers. It may also be, this study concluded, that noise drift from other classrooms makes the teacher less concerned about noise in her own classroom (Leuders-Salmon, 1972a).

Another apparent result, unpredicted by the study, was that grade level and school architecture are related to pupil activity. In open space schools there appeared to be more autonomous pupil activity and less passive behavior in the upper grades than the lower. The reverse was true in the conventional schools leading the researcher to hypothesize a greater emphasis on curriculum and less recognition of pupil maturity in the conventional schools (Leuders-Salmon, 1972a).

The number of teachers on the teaching team also has an impact upon pupil activity, according to this research. In the smallest teams (two teachers) and the largest teams in the study (eight teachers) pupil activity was generally less than that associated with medium-sized teams (three or four teachers). Very large teams (more than four teachers) often experienced organizational problems which frequently led to subdivision of the team into smaller more man-

ageable units. Failure to form smaller teams leads to a less active situation for children (Leuders-Salmon, 1972a, p. 20).

Grant's (1972) study of body language in an open elementary school describes a variety of ways in which pupils moved about the classroom and school. After cataloguing a host of ways in which pupils move in response to the presence of carpeting, the lack of walls, and the absence of assigned seats, the observer concluded that in spite of this seeming variety, the same general kinds of motions and movement exists in pedagogical interactions in both open space and the conventional schools.

There is also divided opinion in the literature as to the significance for learning of all this autonomous activity and movement of children. A number of studies already cited refer to the distractability of students in open space schools. Other writers decry what they see as the reign of paper and pencil and other quiet activities (Seefeldt, 1973).

There does seem to be a tendency in the open space schools, described in the literature, for teachers to gravitate to those activities which produce the least possible noise. As a result, perhaps the use of dittoed work pages and workbooks increases beyond expectation. The unanswered question is, if this is the situation, is it the result of the building style or of teacher training?

There are, perhaps, other factors produced by this environment that as yet are only dimly perceived. One study in the area of social psychology (Anifant, 1972) investigated the effects of the open space school and the conventional school on student risk-taking behavior. Using several measures of risk-taking behavior (e.g., ring toss game) the study also examined the possibility of sex and grade correlations.

The major hypothesis of the study was confirmed. Children who had at least three years experience in an open space school were more inclined to take risks than were children who had three or more years experience in a conventional school. No significant differences were found to support a relationship between risk-taking behavior and sex.

There were, however, significant relationships discovered in school, grade and sex interaction. Girls in open space schools were more risk-taking on the ring toss game than any other sex grouping for the two schools. It was also discovered that risk-taking in both the open space schools and the conventional schools increased with age, with eighth graders being the most risk-taking. Anifant (1972) concluded that the learning experience in an open space school is more conducive to risk-taking than that of a conventional school.

The Open Space School and Student Affect

A number of studies have been conducted in the area of the possible influence of open space schools

upon the self concept of the school child. One such study (Sackett, 1971) yielded data which indicated that self concept mean scores for sixth grade students in open space schools were significantly lower than the scores for sixth grade students in a conventional school. Another study (Beckley, 1972) offered data to support the opposite contention, concluding that attitudes toward self of students in fifth and sixth grades in open space schools were significantly more positive than those of the same grade students in conventional schools.

A study by Heimgartner (1972) also investigated the question of self concept. This study determined that children in open space schools have greater identification with the group than children in the conventional school. Children in the open space school experienced an increase in self-esteem during the year, while students in the conventional school experienced a loss. Children in open space schools do not view themselves differently in the relationship of their size to that of an adult, nor in open space schools do not identify with any one particular adult. The investigator concluded that complexity of the self, hence a more positive self concept, is enhanced by the exposure to a diversified group of adults provided by the open space school (Heimgartner, 1972).

Another study by Purkey, Graves, and Zellner (1970), focused partly on the open space schools, concluded that innovation and open space schools produce positive effects in student self concept. Here the investigators concluded that the children in their study

who were enrolled in the open space school did evidence greater self esteem. They further concluded that as grade levels increased, the differences in self-esteem of pupils in the open space school and the conventional school also increased.

Other researchers have investigated additional areas of the possible affective influence of the open space schools. A study which expanded beyond the consideration of self concept (La Forge, 1972) concluded that while students with experience in open space schools tended to be more tender-minded and sensitive to the needs of others, when the total personality of the individual is considered, the open space school does not significantly affect students.

In a study of children's perceptions of their problems in open space schools and conventional schools (McCallum, 1971) the data indicated that there seems to be no relationship between the type of school students attend and the kind of problems they have. Nor does there seem to be any connection between the type of school and the depth or duration of the problems, nor to who helps students with their problems.

The data relating to overall student satisfaction with their school experience leads to the general conclusion that elementary students in both open space schools and conventional schools enjoy school. A number of studies (Beckley, 1971; Leroy, 1973; Gordon, 1972; Metropolitan Toronto, 1972) conclude that claims advanced in favor of open space schools, as

regards greater appeal to students, are unsupported.

Meyers (1971) has begun to research the claims that open space schools foster the development of greater student self direction. Students in an open space school and a conventional school were asked to identify the characteristics an ideal teacher should possess. Beyond the fact that there was a great deal of agreement from students in both types of schools, students in open space schools clearly indicated that they did not want a teacher who controlled and directed their activities in the traditional mode (Meyers, 1971, p. 102). Students in the open space school seemed to have less need to depend on their teachers than students in conventional schools. When students in the open space schools did indicate a need for more help, it was in the design and carrying out of independent work.

The Open Space School and School Organizational Climate

A number of researchers have sought to investigate the relationship between physical openness and the openness of the schools organizational climate, from the point of view of both students and their teachers. Many of the studies relied on the use of Halpin and Croft's Organizational Climate Description Questionnaire (OCDQ).

One study of a national sample of 133 open space elementary schools concluded that there is little relationship between physical openness and openness of

school organizational climate. Open organizational climates, as measured by the OCDQ, did not occur with greater frequency than closed climates (McFadden, 1973). There were, in fact, significantly higher numbers of open space schools with closed organizational climates (Seidman, 1973). Nor was there a significant relationship between the number of years an open space school had been in operation and the openness or closeness of the schools' organizational climate (McFadden, 1973).

These results are supported by other studies using both the same and different instruments. Jaworowicz (1972) found, by studying school principals who were in their first year in an open space school, and who had moved from a conventional school situation, that there was no resultant change in organizational climate or in the open-closed mindedness of the principals involved. A researcher comparing five open space schools and five conventional schools (Preston, 1972) also found no significant difference in the learning climate of the two types of schools, even though the teachers of the conventional schools perceived their principals to be more effective. Holmquist (1972) adds to the accumulating data which point to the conclusion that there is no observable connection between school plant type and organizational climate.

Only a few studies focus specifically on the unique role of the school leadership in the open space school. White (1973) concluded that the data indicates that open space school principals need greater flex-

ibility than do principals in conventional schools. Open space school principals must also, apparently, possess greater facility in dealing with individual teachers and their needs (Wakeland, 1972; Walters, 1973). Other roles and demands now described in the literature are relatively traditional.

The Noise Factor in Open Space Schools

The fact that more than twenty of the researchers or groups of researchers included in this review devote at least part of their attention to the noise factor in the open space schools indicates the high level of interest in this particular area of concern. As with most of the other subjects connected with research on the open space school, the data are rather inconclusive at this point.

There are several reasons advanced to explain this lack of clarity (Brunetti, 1971) and others believe that the individual teacher's perceptions so strongly determine reactions to noise in the open space schools that accurate external measurement becomes difficult. Other studies seem to indicate that teachers are bothered by noise much more than the students are. Writers agree that the noise reduction quality of the open space school is surprisingly low (Kyzar, 1971, p. 14). That is, a great deal of noise drifts from the area of origin into nearby areas.

Kyzar's (1971) examination of noise transmission in the open space schools is one of the few times researchers have gone beyond the opinion stage in

studying the noise factor. Surprisingly, Kyzar's data revealed that, for the most part, the actual overall sound levels in the open space school and conventional schools utilized in the 1971 study were almost alike. The author concluded that perhaps those teachers who complained of the noise were actually compensating for the absence of visual security.

Kyzar introduced the term "noise reduction". He sought to learn about the amount of noise that carried over from the source area into adjoining areas. He discovered that, in the open space school, cabinets, dividers, carpeting and other devices do almost nothing to reduce the amount of noise that transfers from one class area to another. Operable walls, however, did make a significant difference. There was almost no carryover noise from one classroom to another in the conventional school (Kyzar, 1971, p. 14).

Kyzar concluded that, as a result of his research, it seems that noise in the open space school is an attitudinal problem rather than an actual one, particularly since there was almost no difference in the absolute noise level between the open space school and the conventional school. The noise level varied from a low mean of 65 decibels in a conventional school to a high of 70 decibels in an open space school. Kyzar further concludes that, while this is statistically significant, it is unlikely to affect performance. In fact, in one of the paired school situations in the study, the mean overall sound levels in the conven-

tional school was higher by two decibels than the mean for the open space schools in the study (Kyzar, 1971).

Noise, according to this reasoning, is an attitudinal problem arising possibly as a result of the absence of visual security. It only seems noisier, in other words, in the open space school because it looks noisier. Some of the data from the Stanford research efforts agree with the contention that the lack of visual privacy produces or aggravates the impression that acoustical privacy has also been lost.

Brunetti's research (1971) indicates that grade level makes a difference. Forty to forty-eight per cent of the open space high school students in the study indicated a great deal of visual and acoustical distractability. In the open space elementary schools, however, over fifty per cent of the students reported that they were able to eliminate distraction when necessary, as compared to only twenty-three per cent of the students in the conventional school. Brunetti concluded, therefore, that when such factors as density are controlled, the open space school may provide more opportunity for acoustical privacy than the conventional school. A study by Yates (1968) generally supports the belief that flexibility in physical structure and its results are generally less appealing to secondary school teachers.

One teacher reports that, with the proper planning, "the constant noise no longer seems an

environment of chaos, but rather the beautiful music of children's ravenous appetite for learning" (Shaw, 1971, pp. 15-16). She writes that the noise from four classes working together in the same area was a "blessing in disguise" because it forced the teachers to work out a "plan for individualizing". Other writers claim that this unfortunately limits the choices of instructional strategies available to the teacher to only those which by their nature produce little or no noise and which prohibit the use of varieties of larger group instruction.

The great majority of studies, however, lead in the direction of the conclusion that noise flow is in fact a major detriment to effective instruction. They argue, as mentioned earlier, that the noise produced by one's own classroom may not interfere, but that noise which intrudes from other areas provides a major distraction. Outside noise provides a formidable stumbling block to effective instruction.

Pritchard and Moodie (1971) report, for example, that thirty per cent of the teachers questioned reported that they often had to compromise in the choice of instructional strategies to avoid disturbing other open areas. Aldridge (1972) indicates that while teachers are positive about open space schools in general, most agreed that pupil control arising from distractability due to noise and movement was a serious problem.

The Toronto study (1972) concluded that the open space school was much noisier than the conven-

tional school. Observers with eyes closed were also able to identify a larger number of distinct noises in the open space schools than in the conventional schools. Students, teachers, and architects in Florida's open space schools (Justus, 1971) reported a great deal of distractability due to noise, particularly in subjects like math. Study after study (Richardson, 1970; Ledbetter, 1969; Cheek, 1970; Heimgartner, 1972; Rowland and Boeker, 1973; Lueders-Salmon, 1972b) points to noise as a major problem in open space schools.

Several questions, however, remain. Is the distractability attributed to noise actually a result of decibel level and acoustical spillover or is it the result of movement and visual bombardment? To what extent does this distractability actually interfere with the academic progress of the learners? To what extent does it interfere with the effectiveness and the morale of the teaching staff?

CRITIQUING THE RESEARCH

ON OPEN SPACE SCHOOLS

The basic question to be asked when critiquing the research that has been conducted is a simple one: Can educators believe what the research says? Answering this question is, however, not as simple as asking it.

There are literally dozens of questions that can be asked, to help shed some light on the question of believability. Present comments, however, will be limited to more general statements.

One of the most difficult issues in analyzing this type of research is pointed out by Oldridge (1972). Too often educational researchers share the error of measuring the effects of something that may not really exist. In the area of researching the impact of the open space school this is a particularly critical issue, because many of the researchers infer the existence of fully-functioning open space schools even though little evidence is given to verify it. Whether open space schools are in fact truly open, in addition, operating as they ought is a question that has not really been resolved.

This implies that much of the research on open space schools has been conducted on relatively tenuous grounds, and evidence offered must be recog-

nized as quite tentative. Just as questions on the effectiveness of the middle schools, for example, must remain moot until the middle school concept has been fully implemented in schools to be studied, so too, conclusions on the impact of the open space schools remain extremely tentative until the open space schools are judged to be functioning exactly as they ought. Most of the data supplied at this point, therefore, adds more to an understanding of how open space schools are functioning, rather than what the effects of fully-functioning open space schools upon teachers and learners might be.

An understanding of the immensity of the potential changes brought about by the creation of open space schools leads to an appreciation of those few groups of researchers who have had the wisdom, and the opportunity, to concentrate a number of studies on a narrowly focused set of issues. It is these groups of studies which seem to come closest to actually grappling in a realistic way with significant questions and with wresting meaningful conclusions from the data.

Those studies engineered from Stanford, Hofstra, and the University of Tennessee are good examples to be followed in the future. The influence of the disappearance of internal visual and acoustical privacy (i.e. walls) is a feature of such gigantic dimensions that isolated and solitary researchers are not likely to be able to penetrate the difficulties of the research problem effectively or efficiently.

All research begins with assumptions, and the

tunity for longitudinal studies remains limited, while the need remains great.

Sample size and randomness are critical aspects of all research and in the research on open space schools these questions play an important role in the believability of the research conclusions. Again, the isolation of individual researchers and the wide dispersion of resources seem to have limited both the size and the randomness of the sample included.

Many studies rely on one school or a comparison of one open space school with one conventional school. Randomness is often ignored in favor of hoped-for equivalence. Randomness in teacher and student subjects was often considered; randomness in selection of whole schools was not. Few open space schools are constructed in exactly the same way. Movable walls, sight barriers, carpeting, area sizes, acoustical treatments, size of school populations and many other factors prohibit the assumption of equivalency in such schools.

Few researchers reveal any in-depth familiarity with the literature which existed prior to their own study. In the early years there was, in fact, little to draw upon, but at least in the last few years a significant body of literature has existed which seems for the most part to have been ignored. Hence, few studies, with the notable exception again, of the Stanford group, have built solidly upon prior work, or at the worst, show no knowledge of the existence of efforts other than their own.

research dealing with the open space schools is no exception. Most of the studies assumed, as mentioned above, that the open space schools were functioning as they ought, when comparisons to conventional schools were made. Many studies were based on the assumption, perhaps correctly so, that examining the personal opinions of teachers in open space schools or conventional schools is a valid way to assess the effectiveness of educational practices. Other researchers assumed that the tools they had chosen measured the same factors in the open space schools as they did in the conventional schools. Still others assumed or argued that populations were equivalent when randomization was not possible, but perhaps necessarily so.

The problem of controls looms over most of the research in this area. Some studies, notably those eminating from Stanford University and from several sites in Canada, took great pains to insure the existence of proper controls. Others were not as careful. As a result, the generalizability of the research remains quite limited.

The Hawthorne effect, for example, appears to be one of the control-related problems recognized by few researchers in this series of studies. For the most part, it has been unmentioned. To what extent, in a related sense, is the research on open space schools contaminated by the tremendous novelty of the situation? Will the effects noted in current studies, as some suggest, disappear over time? The oppor-

Researcher bias is often an issue in research in education, and it is a factor in the research on the open space schools. Many of the research studies have been conducted and designed by personnel directly involved in the open space schools that were being studied, or employed in research offices of school systems that had already committed hundreds of thousands of dollars to the construction and operation of open space schools in their school systems. Results favoring the open space schools do seem to appear somewhat more frequently in these studies than in those conducted by investigators whose vested interests are not as obvious.

Instrumentation represents another area of concern when analyzing the research on the open space schools. The most frequent method of research here, as in most research in education at least until recently, has been the questionnaire. A number of studies use copyrighted questionnaires or inventories that have been used successfully time and time again and whose validity and reliability are known. Equally as many studies, however, rely on questionnaires constructed by the researcher, unpiloted, and validated by the traditional panel of experts. Future research should benefit from greater reliance on low inference observation instruments; those which describe, count and categorize.

CONCLUSIONS AND RECOMMENDATIONS

What Do We Know About Open Space Schools?

Keeping in mind the tenuous nature of any conclusions based upon the limited data available on such a complex and massive phenomenon, there are, nevertheless, a number of relatively safe summary statement which might be made. The list which follows represents those conclusions which this reviewer feels offer the most sophisticated hunches about the influence of the open space schools, as they now operate, upon the educational programs operating within.

1. The movement toward greater and greater numbers of open space schools continues. It is relatively certain that a greater percentage of school buildings will have fewer permanent internal visual or acoustical barriers.

2. The great variety in types of open space school facilities will remain for the foreseeable future. Pods, areas, suites, classroom clusters will probably continue to proliferate. The trend toward greater and greater expanses of totally open space may have begun to abate. Future knowledge of the most effective components may gradually bring some standardization in architectural style.

3. The open space almost inevitably leads to some variety of team planning and team teaching. Presently, in fact, it is difficult if not impossible to separate the effects of open space from the effects

of teaming, carpeting, air conditioning, and other factors.

4. The open space school increases the importance and the validity which teachers attach to evaluation of their teaching by their colleagues. Open space schools do not seem to change the importance attached to evaluation by the principal; the evaluation by peers is simply more highly valued. This has a number of implications for annual teacher job evaluations, certification and inservice education.

5. Teachers in open space schools see themselves as more autonomous, and at the same time more highly influenced by their colleagues than teachers in conventional schools. The day in which the school was operated as a symphony conducted by the principal from his office appears to be over in the open space school.

6. Experienced teachers properly introduced to teaching in the open space schools may come to feel more influential, and be quite positive towards teaching in open space schools.

7. Teachers in open space schools feel somewhat more satisfied with their jobs than do the teachers in conventional schools. The reason for this is unclear. Nor is it known how permanent this feeling will be.

8. Teachers in open space schools tend to become more ambitious professionally. That is, they wish to be more influential and to receive recognition for their work within the teaching situation.

9. Teachers who are ambitious apparently do not care less deeply about children.

10. Teachers in open space schools spend

less time conducting routine activities, such as morning exercises.

11. Careful selection of the faculty, combined with extensive preparation of the faculty prior to the opening of the school and throughout the year is crucial to successful experiences during the initial year of operation.

12. It is not clear whether the open space facilitates a more student-oriented teaching style (e.g. individualized instruction) on the part of teachers. The weight of existing data and teacher opinion suggests that it may help to change the role of the teacher from that of lecturer, a verbal source of facts, to that of manager of learning experiences and a source of counseling and motivational support.

13. In spite of a host of criticisms, for the most part teachers enjoy teaching in open space schools and would not choose to return to a conventional school.

14. The question of noise in the open space schools is complex and the data lack clarity. Teachers and students report that noise is a very serious problem. Whether they are, in fact, reacting solely to noise is not now known.

15. Teachers in open space schools believe that the noise level often interferes with student learning and that it limits their options in terms of instructional strategies. Teachers tend to rely on learning activities which produce little noise.

16. Data regarding open space schools and student achievement is, on the whole, inconclusive. Presently, it appears as though the level of academic achievement, in the traditional sense, is relatively

unaffected, or attempts to measure any effects have been largely unsuccessful. Academically, neither the open space school or the conventional school have demonstrated a clear superiority.

17. The weight of the existing evidence seems to indicate that the open space school does provide greater opportunities for alternative learning goals. Decision-making, independence, variety in activities, physical movement, risk-taking, and a number of other factors seem to be facilitated by open space schools as they now operate.

18. Although somewhat inclusive, the weight of the evidence seems to suggest that the open space school does facilitate the growth of more positive concepts of self on the part of the learners.

19. The claim that students are more satisfied with the open space school is, in light of currently available data, unsupported.

20. The open space school does not, in and of itself, produce favorable changes in the perceived organizational climate of a school. Nor does organizational climate improve, according to very limited data, the longer an open space school is in operation.

What Do We Need To Know About Open Space Schools?

Based on the research which has been conducted and the data now available, the following recommendations are offered as possible future directions for research.

1. Future research, where possible, should be conducted by a larger group or association of researchers. A large scale project that is based

upon a knowledge of what has already been done is likely to be much more productive. A statewide project which was coordinated by some larger research group, for example, is needed at this time. It is possible that the limits of what can be learned by independent researchers are being approached.

2. Longitudinal studies of the impact of open space schools on teacher and student behavior and affect should be begun immediately.

3. Future research should be based on low inference observation instruments. Researchers ought to lay aside, at least for the present, the opinionnaire approach to data collection.

4. Additional research should be done in the area of noise in open space schools; particularly studies which go beyond asking the opinions of teachers and students. Some attempts to discover the relative importance of visual vs. acoustical privacy should be begun. The issues surrounding discomfort and distractability continue to stand out as critically important to effective teaching and learning. The answers to the question of why some teachers and students react differently to open space deserves a great deal of attention.

5. Research should be conducted comparing, where possible, conventional schools that have team teaching, air conditioning, carpeting and new, colorful furniture, etc., with open space schools which differ only in the lack of interior walls.

6. Much more must be learned about relationships between open space schools and possible increasing or decreasing levels of academic achievement.

7. Research should begin to investigate the influence of parent, teacher and student involvement in the planning of open space schools upon the successful operation of these schools during their initial years.

8. Research should begin to investigate the importance and utilization of devices which purportedly improve the flexibility of the open space school: non-loadbearing walls, accordian doors, visual barriers, etc. There is, presently, almost no data whatsoever to guide decision-making in this area.

9. Research should begin to document the designs for orientation of teachers and students to life in the open space school, and to design the most successful model for the future. If preparation for teaching in the open space school is so important, much more needs to be learned about the most effective inservice education for this purpose.

10. A research should attempt to discover whether open space schools really do help to facilitate the development of opportunities for student learnings of different kinds: decision-making; risk-taking; divergent thinking, etc. Present data are insubstantial for the design of programs and curriculum in this area. Teachers need to know how to plan for these experiences rather than to depend totally upon fortuitous circumstances to produce them.

11. Research should be conducted to determine the relationship between the effects of open space schools and the age levels and maturity of the students. Much additional knowledge is needed in the area of the relationship between school type and student learning styles.

12. Research should be conducted to determine the effects of various leadership constraints upon teaming in the open space school. Studies might seek to determine, for example, the effects of mandates (to teachers from the principal) which insist upon large and small group activities or which require that portable walls be left open at all times.

13. Research needs to help practitioners recognize the effects of overcrowding; indeed, to determine when overcrowding exists.

14. If it is true, as the research seems to indicate, that open space and team teaching are synonymous, research efforts need to be increased in all areas of the subject of team teaching.

15. Research should be conducted to supplement our knowledge of the most effective floor plans, of the most effective manner of wall placements and other such physical determinants of teaching space.

16. Research should be conducted to determine the effects upon students and teachers who have moved from open space to conventional schools and vice versa.

17. Research should be conducted to determine whether the level of schooling (e.g. elementary, middle school, high school) is in any way related to the effective implementation of open space schools.

What Should Practitioners DO?

Based on what is known about the effects of the open space school, this reviewer offers the following recommendations for educational leaders who are working with or planning the design, construction, and implementation of open space schools. These recommen-

dations seem so critical, that it is tempting to suggest that it may be better not to build an open space school at all than to build one without considering these precautions.

1. The concept of flexibility is so critically important that it is worth repeating any number of times. Any school, open space or conventional, is a failure if it is not flexible. Being rigidly open is no better than being rigidly closed. Until the facts are known about the open space school, every open space school should have folding partitions and movable doors. Each school should have 'retreat areas" for both teachers and students, and not just the principal.

2. Reread suggestion number one.

3. Do not plan an open space school merely for the sake of having one. Be certain that there is wide agreement among all concerned, including the parents and community at large, that the open space school is the appropriate direction to go.

4. Because the initial cost of a school building is only about six per cent of the total cost of the operation of the school, over a period of years, it is extremely unwise to cut building costs. Doing so may bring unfortunate consequences later. Schools should be designed and constructed (Frazier, 1972) to meet well formulated instructional ends rather than primarily to cut building costs.

5. Early staff development and curriculum planning are essential for the smooth opening of a new open space school. Even more critical for the successful operation of the school is a well planned inservice education program which continues throughout the year.

Because of the changes which the open space school makes in the lives of teachers, training in interpersonal communications and team operations and planning will be particularly important.

6. School principals also need a great deal of inservice preparation. Their roles will be different, and they need to develop new skills. Each principal should be appointed at least one year prior to the opening of the school, with opportunities for visiting other open space schools and for recruiting the type of teachers that will work well in the open space schools.

7. Develop a philosophy and a statement of goals and be certain that all constituencies agree to both principles and practices (French, 1972).

8. Remember community involvement all along the way (French, 1972). It may be difficult and time consuming to do so, but the results, in terms of heightened community support for the school, will be worth it.

9. Avoid the seductive temptation to yield to overcrowding. Build schools with expandable outer walls. Begin by designing the instructional areas about half again as large as estimates say they ought to be. Architectural opportunism (seeing how much space can be eliminated) is a sure path to the creation of a "new kind of school house slum" (Frazier, 1972).

Final Comment

Too often in the history of American education the swing of the pendulum has been the only guide to

innovation and change. Eggcrate schools with long attached rows of one room school houses have given way to return to some form of closed learning areas similar to those that have been so recently abandoned in favor of the open space school. The excesses of one design must not be permitted to determine the next plan.

Educational excellence is not inherent in any architectural setting. Schools for the remainder of the twentieth century must be designed to permit the full range of educational experiences which are certain to be developed, and to this end the concept of flexibility must be the key to the design of schools for tomorrow. Form, indeed, must follow function.

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